

National Aeronautics and Space Administration



# Goddard View

Volume 9 Issue 17  
December 2013



## GPM ARRIVES IN JAPAN

## THE WEEKLY



### HST Sees Evidence of Water Vapor Venting off Jovian Moon

Hubble has observed water vapor above the frigid south polar region of Jupiter's moon Europa, providing the first strong evidence of water plumes erupting off the moon's surface. Learn more by clicking on the image.

### Conversations with Goddard

Whether he is at work or at play, project manager Dave Mitchell is determined to give it his all. Click on the picture to out what Goddard people do on the job, how they support our mission and what keeps them coming back to work.



### Last of Webb's Mirrors Arrives at Goddard

Marking a huge mission milestone for the Webb Telescope, the last three of the 18 flight primary mirror segments arrived at Goddard on Dec. 16. After traveling across the country, the mirrors were prepped to enter a Goddard clean room for inspections. Click on the photo for more Webb.

### GOES-R Instrument Gets Cleared

GOES-R completed its next instrument, the Solar Ultra-Violet Imager, which is now ready for integration onto the spacecraft. SUVI will observe the sun in the extreme ultraviolet wavelength range. To learn more about GOES-R, click on the photo.



### GoddardView

- The Weekly – 2
- GPM Status Report – 3
- Bronze Star Veteran Reveals the Honor in Silence – 4
- The Fantastical Life of a GIS Analyst – 6
- New Video Reveals NASA's Webb Telescope is "All Sewn Up" – 8
- Goddard Lab Chief Wins Maryland Chemist Award – 9
- Culminating a Year of Innovation: Snapshots of the 2013 IRAD Poster Session – 10
- GPM Mission Project Scientist Passes Away – 12

**On the cover:** GPM's shipping container is unloaded from the U.S. Air Force C-5 cargo plane that carried it to Japan. Photo credit: NASA

## GoddardView

*Goddard View* is an official publication of NASA's Goddard Space Flight Center. *Goddard View* showcases people and achievements in the Goddard community that support Goddard's mission to explore, discover, and understand our dynamic universe. *Goddard View* is published weekly by the Office of Communications.

News items for publication in *Goddard View* must be received by noon Wednesday of each week. You may submit contributions to the editor via e-mail at [john.m.putman@nasa.gov](mailto:john.m.putman@nasa.gov). Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

## CONTENTS



Following the Global Precipitation Core Observatory's arrival at the Tanegashima Space Center in Japan, efforts by the NASA and Japan Aerospace Exploration Agency team now focus on final checkouts and preparation for launch in early 2014.

After the satellite was removed from its transportation container, the NASA team conducted preliminary inspections and found everything to be in very good shape. None of the systems that monitored the satellite's condition during the move from NASA Goddard to Japan showed any thing outside of normal levels. This means there will be no need to re-test the deployable parts of the observatory.

This month, the number of NASA personnel at the Japanese launch site will increase from the normal staff of 50 to approximately 80-90 in order to allow 24/7 operations during Comprehensive Performance Testing. This activity involves engineers making final preparations to the satellite and verifying that all the elements of the observatory are ready to support mission objectives.

Pre-CPT work included testing of both the flight and spare batteries. The spare batteries have been moved into storage and flight ones are now installed on the observatory.

The Global Precipitation Measurement mission's Core Observatory began its final Comprehensive Performance Test

on Dec. 9. The test will run 24/7 over the next few weeks as every system and subsystem is turned on and run through its tasks. All scheduled work should be completed in plenty of time for the NASA group to return home for Christmas.

This is the first time all the Core Observatory systems have been powered on since its shipment to Japan. The results of the tests will be compared to pre-shipment performance test results to ensure that no problems have arisen due to transit, and that the spacecraft is prepared for in-orbit operations.

GPM's Core Observatory has more than 30 systems and subsystems that are being tested. Almost all the systems have fully redundant electronics in case of a failure in-orbit, so each test has to be run more than once. The engineering team for each system monitors the progress around the clock in the control room outside the clean room at Tanegashima Space Center. ■

Above: Following arrival in a cleanroom at the Tanegashima Space Center in Japan, the [Global Precipitation Measurement](#) core observatory was attached to a custom-designed satellite mount that allowed the NASA team on-site to perform preliminary inspections and evaluations of the spacecraft. Photo credit: NASA/Goddard/Michael Starobin



“I will remember this for the rest of my life.”

# BRONZE STAR VETERAN REVEALS THE HONOR IN SILENCE

By: Dewayne Washington

Members of Goddard’s Veterans Advisory Committee invited Colonel Gregory Gadson, Garrison Commander of the U.S. Army Fort Belvoir to be the guest speaker for their third annual tribute entitled, Saluting Those Who Served. Joining forces this year with the VAC were the Equal Accessibility and African American Advisory Committees.

The Chesapeake, Virginia native, a bilateral above-the-knee amputee, Gadson is the first Army amputee to command a major military installation. Following an extended pause of more than 10 seconds, the three-time recipient of the Bronze Star began his presentation. “It is not very often a speaker begins with silence,” the occasional actor and motivational speaker said. “It is uncomfortable, forced . . . we really don’t know what to do with the silence.”

The colonel talked about how a moment of silence has been used to acknowledge the silencing of the cannons to end the Great War, World War I. He told the audience that today nations around the world pause, with solemn pride and a remembrance of the heroism of those who served. “By being here today we honor our past warriors and those who have made the ultimate sacrifice in the name of freedom,” Gadson said. “They chose to serve a cause that is greater than self.”

Gadson also talked about our country’s current warriors and the sacrifices they and their family make daily to guard our freedoms. “They protect us from danger and have given others the opportunity for a better life,” Gadson explained. He said no praise could truly match the magnitude of a veteran’s service or sacrifice, “We can only offer you this humble moment of silence.”

Himself a veteran of five major military conflicts, Gadson personalized his presentation about service members heeding the cries of the world against war, strife, injustice, hunger, disease and more. “I know from my own experience how chaotic the world can be,” he said. “As I think about the chaos and what I’ve been through, I am grateful to those who have come before me.”

In closing, Gadson spoke of the reflections by veterans and of a grateful nation. “We call Veterans Day a holiday but for many veterans it is a day of memories that drives them to live each day to the best they can. In our moment of silence we lift our thoughts, gratitude and prayers to our veterans; lift your spirits to their families and speak with your silence,” Gadson concluded.

Before his presentation Colleen Hartman, Goddard’s deputy director for Science, Operations and Performance, read a short biography of the former West Point football player’s accomplishments. It was followed by a National Football League-produced video outlining the extraordinary achievements of Gadson. It included his association with the two-time Super Bowl champion New York Giants football team. It is a story about how a wounded, broken warrior rediscovers his life’s mission while inspiring a team to twice reach the summit of their achievement aspiration.

The VAC chairperson, Mark Hubbard, was unable to attend because of work commitments but was able to view the program over the Internet within the Oakland International airport in California. “I became really uncomfortable after a few seconds when he began with silence,” Hubbard said. “I wasn’t sure that there was something physically wrong until he began to talk about how silence makes us Americans very uncomfortable. I know I was.”

For Hubbard, the viewing was very inspirational even from such a great distance. “I wanted to show my computer screen to everyone in the terminal because I was busting with pride; proud of the Goddard veterans and others who made the event memorable; proud that Colonel Gadson was our guest speaker who gave such a moving speech. I hung on his every word.” Hubbard also said he was thankful to everyone who had anything to do with this year’s tribute even if it was simply to attend.

One attendee summed up the experience as presenting a new prospective for him. “You know after this I see veterans very differently. I never really realized the sacrifices some individuals have made and continue to make so others like myself can live the life I have. I will remember this for the rest of my life,” Goddard community member Michael Booth said.

Goddard’s VAC was organized several years ago by a small band of veteran brothers and sisters interested with supporting one another and standing as a reminder of veterans who had served. “Over the years veterans have continued to serve as NASA administrators, scientists, engineers and so many others positions,” former VAC senior champion Adrian Gardner, himself a veteran said. “A willingness to serve is how the American service member is bred and it is a desire that last a lifetime.” ■

Opposite: U.S. Army Colonel Gregory Gadson. Photo credit: NASA/Goddard/Bill Hrybyk



# THE FANTASTICAL LIFE OF A GIS ANALYST

By: Elizabeth M. Jarrell

**W**hat do climate modeling, malaria and black rhinos have in common? It turns out that Geographic Information Systems can be adapted to study all three. Wherever GIS is being used for humanitarian purposes, senior programmer analyst Joe Nigro is never too far away.

“The common factor is knowing how to use GIS. I’ve worked on a range of projects from plague modeling in the American southwest to semi-automating glacier boundary extraction in Alaska. I never know what I’ll be working on next. GIS opens up so many possibilities; it opened up the world to me,” said Nigro.

GIS is a computer modeling system that allows for the integration and collective analysis of geospatial data from multiple sources including satellite imagery, GPS recordings and textual attributes associated with a particular space. The strength of GIS is that it can be used in so many different applications.

“I am very mobile. No matter where I am, I can modify GIS programs on my laptop to suit the particular project” he said.

As part of the HIMALA team, Nigro assisted in developing a free, open-source modeling system that isolates glacier and snow melt contribution to stream flow in an effort to help minimize the impact of flooding on people and their resources such as food and shelter. Nigro recently delivered this system to the International Centre for Integrated Mountain Development headquartered in Kathmandu, Nepal. ICIMOD will train eight partner countries in the Hindu-Kush Hima-

layan region on this system next year. If additional funding becomes available, Nigro hopes to assist by enhancing this system with broader climate change modeling capabilities.

Previously, Nigro used his GIS skills to assist Goddard climate scientist Compton Tucker for four years on an archeological survey in Gordion, Turkey.

Last year, Nigro traveled to 17 countries, a few for work but most for his volunteer activities. Wherever he goes, he is always trying to figure out a way to get involved in projects to help out. He personally funds all of his volunteer efforts. He has no permanent home, little time for a social life, not even a pet. When stateside, he camps out with relatives and friends. His life as a nomad is both complicated and simple, but always gratifying.

“I got to a stage where I wanted to give something back and I have skills that can help people. One of the best things about travelling is contributing. Then you actually feel that you have immersed yourself in the place,” said Nigro.

In April 2012, Nigro visited his cousin, who is a malaria program analyst for the Clinton Foundation in Namibia. While there, Nigro trained the staff to use their lab’s new GIS system both to create time-series maps of malaria risk in northern Namibia and to use as a planning tool for resource distribution. He would like to return there soon to continue with this work.

As preparation, he took a lot of malaria pills. He has had every shot known to mankind, including one containing a small amount of live virus for Japanese encephalitis—which

is incurable. “The doctor sat in a chair in front of me and watched me very closely for thirty minutes after I got that shot,” said Nigro.

Prior to Namibia, and by special request of two of his friends who live in North Luangwa National Park, Nigro got involved in conservation efforts in Zambia. The park had lost all their black rhinos, which are almost extinct. His friends were in charge of reintroducing a few of them from South Africa back into the park. They needed to be able to track the black rhinos and to monitor anti-poaching patrols. Nigro used his GIS skills to write programs that would give them timelier monitoring information that they needed, both to ensure there were no gaps in the patrol routes and to understand why some of the rhinos were dying naturally.

“Living within the park in Zambia was terrifying, but I loved it. At night, it is total darkness. All you can hear are the animals. We were right on a river full of crocs,” he said.

Nigro just flew to Zurich to discuss ways to become involved in conservation efforts for snow leopards, whose overall habitat in the mountains of central Asia has been dramatically and negatively impacted by climate change. He hopes to use GIS to map areas of suitable snow leopard habitat based on climate change scenarios. Known as the “ghost cat,” snow leopards are rarely seen except on remote cameras.

He recently decreased his employment to three-quarter time. He intends to devote the rest of his time to

volunteering on global humanitarian and conservation projects, with a focus on Africa and Asia.

“I like Africa. Anything can happen in Africa. You can see the most amazing things and then be stuck on the side of a dirt road, waiting three days for a bus. You never know what to expect,” Nigro said.

In addition to his trusty laptop loaded with GIS software, he sometimes relies on solar-powered generators. He typically loads his backpack with a cell phone, a GPS unit, waterproof clothing and outerwear, a headlamp, a portable hydration reservoir, regular and underwater cameras and his Leatherman tool. Sometimes he even carries his guitar. He brings energy bars for emergencies. His only amenity is a small stash of peanut M&Ms. Although he does not carry a gun, the guides are usually armed.

Nigro claims that he was always adventurous, recalling that he spent a lot of time as a kid playing in the dirt imagining quests. Travel is not in his blood; none of his immediate family is big travelers. Beneficence, however, is in his genes. He is related on his mother’s side to the Medici family, who were great patrons of the arts during the Italian Renaissance in the 15th century.

“My life has become so fantastical. I want to settle into a normal life, but I don’t know how. I don’t want to be bored or restless. The plus is that I feel like I am contributing on a global scale,” said Nigro. ■

Above: Sunrise along the river within North Luangwa National Park. Photo credit: NASA/Goddard/Joe Nigro



**N**ASA's Webb telescope has a five-layer sunshield that is as large as a tennis court. The sunshield will help keep the infrared instruments aboard as cold as possible by blocking out heat and light.

The newest video in the "Behind the Webb" series takes viewers behind the scenes to reveal how the pieces that make up each layer of the James Webb Space Telescope's thin sunshield are bonded together.

The video called "Webb's All Sewn Up" was produced at the Space Telescope Science Institute in Baltimore, Md. and takes viewers behind the scenes with engineers who are testing or creating the Webb telescope's components.

In the video, STScI host Mary Estacion takes the viewer to the Mantech facility in Huntsville, Alabama to find out just how engineers on the ground are working with the sunshield layers and binding them together.

Estacion interviewed John Cranston, the sunshield process engineer at Mantech's NeXolve Corporation who described Kapton, the raw material that creates the sunshield. NeXolve is a subsidiary of ManTech International Corporation and completed the manufacturing of all template layers for the Webb Telescope sunshield.

Cranston showed viewers Kapton and explained how the aluminum and silicon coatings that are applied to some sunshield layers work.

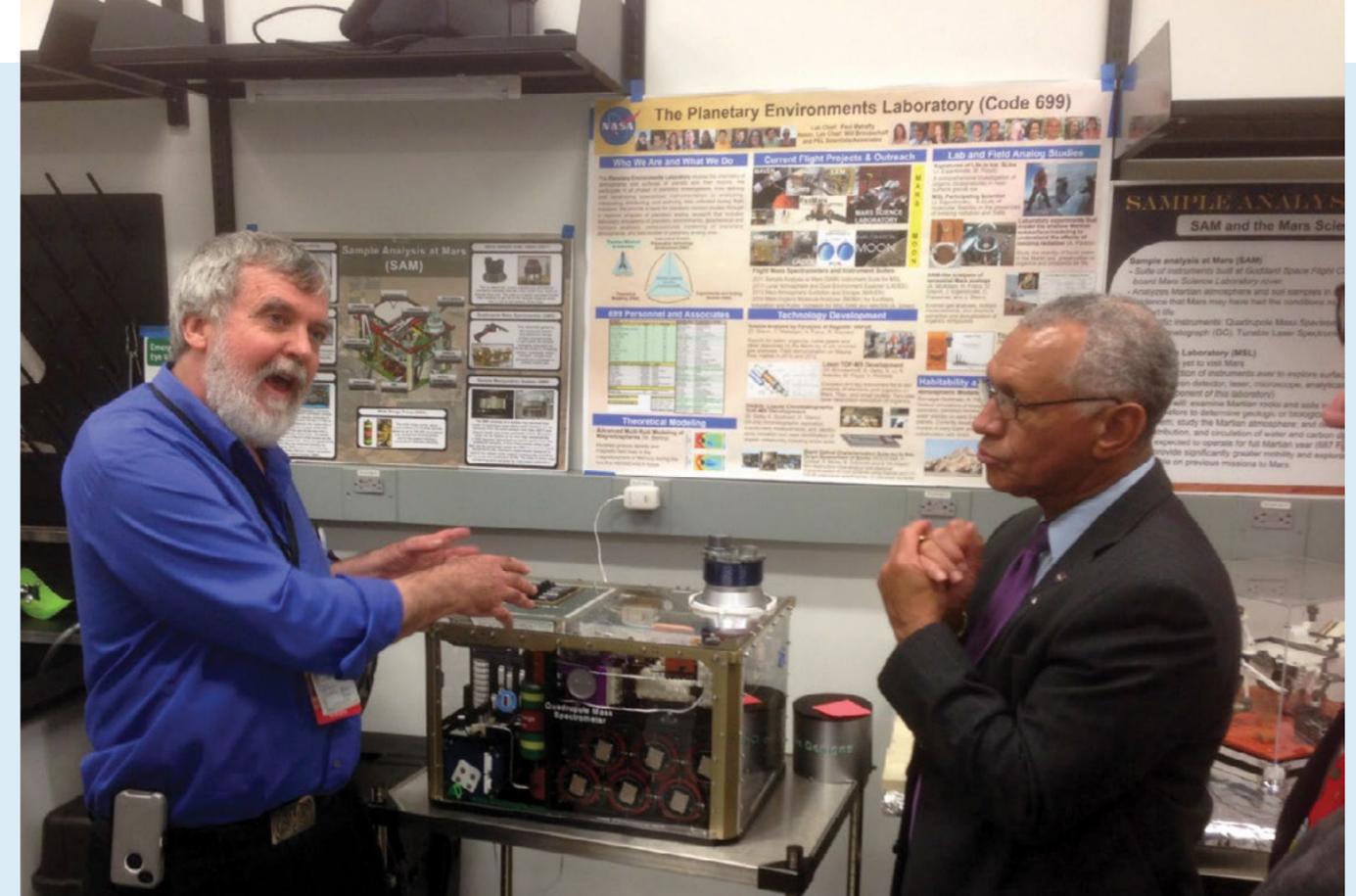
Each of the five layers consists of at least 55 individual pieces or "gores" of Kapton bonded together, and each layer is shaped slightly differently. The first layer faces the sun and will be the hottest, while the fifth layer faces the telescope and instruments and will be the coolest.

Bonding the extremely thin gores of the sunshield together to achieve precise shapes is vital to the sunshield's performance and was a significant engineering challenge. Engineers couldn't use glue because it would add too much mass.

In the video, Mary takes viewers to see where the individual pieces will be seamed together by a thermal welding technique on what is called the "spot-bonding machine." The machine applies just the right amount of heat to the material in small spots to fuse it together but not so much that it burns through.

The "Behind the Webb" video series is available in HQ, large and small Quicktime formats, HD, large and small WMV formats, and HD, large and small Xvid formats. ■

Above: This episode shows how the sunshield becomes the proper size and how it's being tested to ensure it will withstand the rigors of space. Some parts of the video are obscured due to the proprietary processes used to make the sunshield. Image credit: STScI. Click on the image to see the video.



**P**aul Mahaffy, Chief of the Planetary Environments Laboratory at Goddard, received the 2013 Maryland Chemist Award on December 11. The award is given each year by the Maryland Section of the American Chemical Society for outstanding achievement in pure or applied chemistry, chemical engineering or chemical education.

Mahaffy was recognized for laboratory research conducted throughout his career, for designing and building NASA instruments to investigate planetary atmospheres and environments, and for mentoring students and young scientists.

"Our committee likes to honor people who reach out into the community in addition to achieving excellence as chemists," said Angela Sherman, chair of the awards committee for the Maryland Section. "Paul Mahaffy has done a tremendous amount of work and takes his mentoring role very seriously."

The award was presented by Sherman on behalf of the committee during an honorary dinner held at Notre Dame of Maryland University in Baltimore.

"This award is a wonderful honor from my fellow chemists, and I am proud to accept," said Mahaffy.

The lab headed by Mahaffy specializes in developing space-qualified instruments that carry out chemical analyses. These systems include the Sample Analysis at Mars instrument suite

on the Mars Science Laboratory's Curiosity rover. SAM is a fully operational analytical lab that has been reduced to roughly the size of a microwave oven and is now exploring the Red Planet, gathering evidence of the planet's past habitability and studying the composition of its lower atmosphere, soil and rocks.

Mahaffy's team also designed and built the mass spectrometers on NASA's Lunar Atmosphere and Dust Environment Explorer, which is orbiting the moon, and the Mars Atmosphere and Volatile Evolution mission, which is en route to Mars. Earlier in his career, Mahaffy was in charge of the Galileo spacecraft's measurements of the isotopes and major elements in Jupiter's atmosphere.

Mahaffy earned his Ph.D. in physical chemistry from Iowa State University and has worked for Goddard for more than 30 years.

The Maryland Section of the American Chemical Society promotes awareness and interest in chemistry subjects through meetings, community outreach and involvement with students of chemistry and science. The Maryland Chemist Award, established in 1962, specifically recognizes the achievements of scientists who conduct their work in the state of Maryland. ■

Above: Mahaffy explains the Sample Analysis at Mars instrument to NASA Administrator Charles Bolden. Photo credit: NASA/Goddard/Jay Friedlander

## NEW VIDEO REVEALS NASA'S WEBB TELESCOPE IS "ALL SEWN UP"

By: Rob Gutro

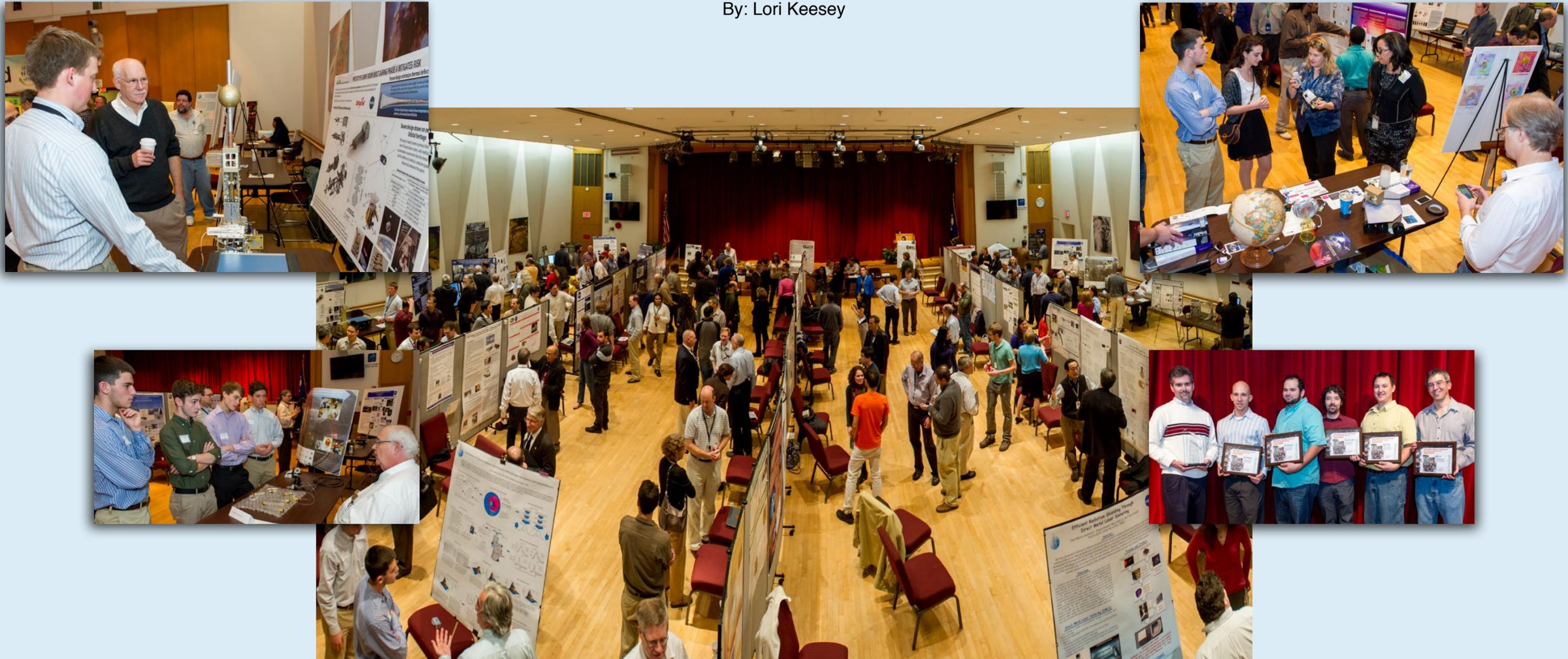
## GODDARD LAB CHIEF WINS MARYLAND CHEMIST AWARD

By: Elizabeth Zubritsky

Volume 9 Issue 17 • December 2013

# CULMINATING A YEAR OF INNOVATION: SNAPSHOTS OF THE 2013 IRAD POSTER SESSION

By: Lori Keesey



**H**undreds of people stopped by to chat and make connections with 99 Goddard principal investigators who presented posters at the Office of the Chief Technologist’s annual IRAD Poster Session on Dec. 5.

Included in the crowd were officials from NASA’s Office of the Chief Technologist and a group of students from Bethesda-Chevy Chase High School in Montgomery County and the British School of Washington, who shadowed Goddard Chief Technologist Peter Hughes that day as part of Career Day, sponsored by Junior Achievement. “The kids were absolutely ecstatic, even gushing, about the fabulous day at Goddard,” Hughes said.

All came to learn more about the cutting-edge technologies Goddard scientists and engineers are pursuing to meet NASA’s next-generation technology needs and to make promising connections that could result in successful missions in the future.

Center: Over the course of three hours, this year’s IRAD Poster Session attracted hundreds of visitors.

Clockwise from top left: Principal Investigator Robert Pfaff (background) stands next to a prototype of an electric field boom that he developed for the Atmosphere-Space Transition Region Explorer. Although NASA did not select his mission concept during the last Explorer Call for Proposals, Pfaff is fine-tuning the 10-meter boom. An earlier version of the boom now flies on a U.S. military satellite.

Principal Investigator Bryan Duncan (standing behind the table) created an innovative “plug and learn” electronics kit, an activity booklet, and lessons — an all-in-one resource to educate parents, teachers, informal educators, and children about the fundamentals of electromagnetic energy and its relationship to remote sensing and NASA science. His co-principal investigator, Ginger Butcher, talks with visiting students, as Romae Young listens in.

This year, OCT’s “IRAD Innovator of the Year” award went to Tom Flatly and the SpaceCube team (from left to right): Tom Flatley, Dave Petrick, Dan Espinosa, Alessandro Geist, Gary Crum, and Mike Linn. Since its flight debut in 2009, the SpaceCube flight processor has evolved into a family of products that offers science missions a much-needed alternative for science data processing, particularly those requiring more robust computing power to handle significantly higher data rates.

Students from Montgomery County’s Bethesda-Chevy Chase High School talk with Principal Investigator Fred Minetto, who has created a novel way to clean mirrors and lenses in clean rooms using a one-atmosphere electron gun whose prototype hardware is displayed on the table. ■

Photo credit: NASA/Goddard/Bill Hrybyk

Compiled by Rani Gran and Ellen Gray

## GPM MISSION PROJECT SCIENTIST PASSES AWAY

**A**rthur Hou, the project scientist for the upcoming Global Precipitation Measurement mission, died at home Nov. 20 from pancreatic cancer, which he had battled for more than a year.

“Arthur was an exemplary project scientist who kept the GPM flame alive during the various challenges as the project was being formulated and developed,” said Nick White, director of the Sciences and Exploration Directorate at NASA’s Goddard Space Flight Center in Greenbelt, Md. “It is so unfortunate he could not see the launch. His legacy will live on through the successful launch and operation of GPM next year.”

Under his skilled and dedicated stewardship, GPM became a truly global effort with a global team. He excelled in providing scientific oversight to meet or exceed GPM’s many science objectives and application goals. Due in part to his commitment to the GPM mission, a new satellite will soon be in orbit that will significantly increase our understanding, monitoring and prediction of global precipitation systems and high-impact weather events such as hurricanes and typhoons.

“Hou was not only a superb scientist, he was a gracious and thoughtful person,” said White. “He forged international friendships with colleagues and partners around the world, while still finding time to mentor junior and mid-level scientists. His presence, leadership and generous personality set an example for all of us to follow. He was the consummate team player and will be greatly missed.”

Hou joined Goddard in 1990. He previously served as the NASA deputy project scientist for the joint U.S.-Japan Tropical Rainfall Measuring Mission. His work focused on the use of space-based observations of clouds and precipitation in global modeling. Earlier in his career, he worked in planetary sciences, studying Venus and Uranus. His research interests also included dynamic meteorology and climate modeling.

Hou received his doctorate in applied physics from Harvard University and his bachelor’s degree in aeronautics and astronautics from the Massachusetts Institute of Technology. He received numerous awards during his career, including a Robert H. Goddard Exceptional Achievement Award in Leadership. He was recently elected to be a Fellow of the American Meteorological Society.

He is survived by his wife Sandra and his daughter Sara. ■

Below: Dr. Arthur Hou, the project scientist for the upcoming Global Precipitation Measurement, or GPM, mission, died Nov. 20, 2013. Photo credit: NASA’s Goddard Space Flight Center

